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THE BIRDS OF CELEBES.

The Birds of Celebes and the Neighbouring Islands. By A. B. Meyer and L. W. Wigglesworth. Two volumes. Pp. xxxiii, 392 and 590; with 45 plates and 7 maps. (Berlin: R. Friedlander und Sohn, 1898.)

FEW regions of the world approach in interest to the naturalist the wide Archipelago strung upon the equator, between the Asiatic and the Australian continents, both of which claim a share in the broken lands between which Wallace's Line rides the marches. Of all these islands none perhaps have attracted more attention than Celebes, notably on account of its strange configuration, but especially from its central position in the archipelago which has given a remarkable character to its fauna, the affinities of which have bandied it from one to the other of the two zoological realms between which it lies. To which of them it will finally appertain must still remain an open question till it has been more fully explored, botanically as well as zoologically. Towards the settling of this question, however, Dr. Meyer, the distinguished Director of the Royal Museum in Dresden, in collaboration with Mr. L. W. Wigglesworth, has made a notable contribution in the work under notice, wherein the ornithology of the Celebesian area (as the authors name the main island plus the neighbouring islet groups in its immediate vicinity) is discussed. Both authors have brought special qualifications to their task, for both have large experience as observers in the field, Dr. Meyer having several years' personal knowledge of the area in question. That every care has been taken by them in the preparation of this monograph is testified to by the six years of constant toil which the subject has exacted from them.

The systematic account of the individual species found in the area is prefaced by a valuable introduction of 130 pages, in which the authors give a short biographical note concerning the naturalists and collectors who have worked or written upon the birds of Celebes. This is followed by an account of the seasons and winds (illustrated by two coloured maps) in the East Indian Archipelago, in their relation to the dispersal and distribution of the birds. A section is next devoted to migration in the archipelago, with reference to which the authors remark that "during our studies it has become abundantly evident to us that ornithologists are not generally aware that migration goes on in the East Indies to the great extent it does." They enumerate fifty-four "of the more prominent migratory birds of Celebes," with tables which tend to "prove that each species has its own route or routes of migration." Some of these species come from Norway *via* Siberia, China and the Philippines to North Celebes, and go no further; others hold on their course to New Guinea, Australia and New Zealand; while yet others fly directly from Northern Asia and Japan to the Philippines, North Celebes or the Moluccas, hugging the coast of the Western Pacific. In their return journey the migrants do not appear "always to return in spring by the route pursued in autumn, often apparently being rare or absent in districts through which they pass in

abundance in other seasons," while a few remain and probably breed in their winter quarters. As to the causes of migration, however, the authors afford us no new facts or suggestions tending to bring us nearer the solution of the "mystery of mysteries" of bird life.

A further section of the introduction is devoted to the subject of "variation or modification of structure and plumage" among the birds of Celebes, under the headings of individual and of geographical variation; seasonal changes; sexual differences, and changes depending upon age. Under the last heading the authors provide "some evidence drawn from Celebesian birds that modifications of shape . . . of feathers are caused by the ever-repeated action of mechanical attrition . . . and are ultimately transmitted to offspring," and they take as one of their examples the case of the racket tail feathers of *Prioniturus*. The two middle tail feathers of these birds "are prolonged much beyond the others, and in adult birds the over-reaching portion of these two rectrices is converted into a bare shaft tipped with a spatule of ordinary web." Drawings are given from specimens in the Dresden Museum showing that the feathers come in in the adult birds with the shafts bare, a character which must therefore be congenital and hereditary. According to the authors, the course of events must have been as follows:—the two middle tail feathers becoming (for no specified or known reason) a little longer than the rest, were by attrition on the twigs of trees, walls of their nesting-holes, &c., narrowed at the tips; the friction reacting on their roots resulted in still greater lengthening of the feathers; further attrition resulted in half-formed rackets [why?]; still further continued attrition and further lengthening of the feathers resulted in the "production of other stages up to the most advanced development of the present time"—"a process of ages, more and more advanced results being obtained in successive generations and transmitted by heredity." Their "arguments in proof that these rackets are the inherited effects of attrition" are shortly: (1) that such can easily be formed artificially by scraping; (2) where the shafts are not exposed to attrition they are not bare; (3) rackets do not occur on unexposed feathers sheltered from attrition; (4) rackets are present in birds having no affinity with one another over the most varied positions; (5) remains of the web are often to be found on the shaft of the racket; (6) there appears to be no other means for accounting for their origin—they are not sexual, not useful, and not "recognition markings"; (7) the Motmots which produce these racket tail feathers by biting, now produce incipient rackets hereditarily. These arguments (?) hardly carry conviction; but if the truth be that the rackets are the inherited effects of attrition, one asks why so few feathers specially exposed to attrition by twigs and sides of holes, &c., as the external rectrices and remiges of all birds, and especially the exterior *lengthened* feathers of wedge-shaped tails (*Dicrurus*), are neither bare nor racket-shaped nor incipiently so. One points also to the middle tail feathers of the male *Paradisea rubra*, which—judging their development by the progress of their moult, as the authors do—*begin* "rather *shorter than the rest of the tail*," then are "moderately lengthened and with webs narrowed in the middle," and finally end

in a "black horny riband, bearing at its extremity a spatulate web" (Wallace). Why have the females of *Parotia sefpennis* no spatulate occipital plumes, and those of the spatulate or bare rachised tailed Birds of Paradise no rackets, if the character is a non-sexual one? In the case of the Motmots, may not the narrowing of the web of the tail feathers be due to some physiological, pathological, or other cause, which attracts the bird's notice to the spot, causing it to peck at the feather and eventually bite away its webs; a habit which might become as fixed as the biting of the nails is from parent to children in many families. In the specimens which lived in the Zoological Gardens in London the central tail feathers came in with the webs on and were bitten off by the birds. The spatulate feathers would not arise, or would be lost, probably, if the Motmots left their tails alone. The very varied positions in which these singular plumes appear (altogether only in a few groups of birds), seem to indicate that it is not a question of attrition or excitation on objects with which the feathers come in contact, otherwise the occurrence of similar feathers would be far more common than it is, especially in the families to which the birds sporting such ornaments belong, since their habits, flight, and movements are similar. And if the rush of air through the feathers of the wing of certain pigeons can produce attenuation of their first primary, the same, or at least some, effect ought to be produced by the same cause, not only in many other pigeons, but also in hosts of other birds.

The final section of the introduction discusses the geographical distribution of the birds of the Celebesian area, and shows that it is inhabited by 393 species, and that fifteen genera and 108 species are peculiar to it. Each species is fully treated of in the systematic part of the work, as to its synonymy and diagnosis, with interesting and often lengthy accounts of its distribution and habits. Of these, seventy-seven are figured in forty-five plates by Herr Geisler, the artist of the Dresden Museum, who has, at the request of the authors, represented "the exact hue of the specimens painted, sometimes at the cost of the artistic effect and clearness of tint seen in the English productions." The work is also embellished by seven maps—two climatological, two topographical, and three devoted to geographical distribution.

As a result of their laborious investigations, the authors find that

"one-half of the peculiar birds of Celebes have their nearest affinities in the Oriental Region, and one-fifth only in the Australian Region; but the Australian forms seem to be, on the average, rather more strongly differentiated than the Oriental forms. . . . The origin of the Celebesian avi-fauna is principally an Asiatic one, but Celebes, as a whole or as a group of islands, was separated early from the Continent, or never was intimately connected with it. . . . The special faunas of Celebes, however, . . . are far from worked out. . . . The future, therefore, only can decide whether the ornithological facts as at present known teach us correctly that Celebes belongs to the Oriental Region and not to the Australian. . . ."

The authors are to be congratulated upon the production of one of the best and most exhaustive ornithological monographs of a special region that have for a long time appeared either in England or on the Continent.

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PUMPING IN MINES.

Mine Drainage; being a Complete Practical Treatise on Direct-Acting Underground Steam Pumping Machinery. By Stephen Michell. Second edition. Pp. xviii + 369. (London: Crosby Lockwood and Son, 1899.)

AS a somewhat heterogeneous collection of statistics, drawings and descriptions of pumping machinery, the work before us probably stands unrivalled in our own or any other language. It is profusely illustrated by means of excellent phototypes and woodcuts of pumping engines, as well as the details of their valves and valve gear, and contains minute verbal descriptions of their construction and mode of action. According to the author, most of the drawings have been supplied by the engine-makers, a fact with which no fault can be found, since there is no better source from which illustrations for a work like this can be obtained. But when we come to a consideration of the verbal descriptions the matter assumes a different aspect. Except in those cases in which an author feels himself bound to explain the views or original work of another author with precision, so as to avoid the possibility of misconstruction, descriptions quoted verbatim are out of place. In describing appliances with which he is, or ought to be, familiar, he should do so in his own words and from his own point of view, and at the same time give the reader the benefit of his opinions and criticism. If he quotes page after page from trade catalogues as our author does, not omitting even letters of commendation from customers, he abdicates his claim to the position of an author and becomes a simple compiler.

The work before us partakes far too much of this character, being to a large extent a compilation of the contents of catalogues; and as this is a class of information that is liable to vary with the issue of each new catalogue, and can be always obtained post free, it is a pity to swell the bulk of a volume by inserting it without measure.

The first twenty-two pages of the book contain introductory matter, including a few definitions and a history of the Worthington and other pumps; then follow four pages filled with the names of pumps and their makers, and thereafter the subject-matter is proceeded with. Hydraulic and electric pumps, together with four and a half pages of "Hydraulic and other memoranda," are, for no apparent reason, relegated to an appendix; and the volume closes with a good index.

In linking up the subjects and in venturing to express his own opinions, the author is not always equally happy in his remarks. For instance:—

"Height is essential to effectiveness in an air-vessel, mere lateral extension of volume adding little to its value" (p. 72)

"The pump valves act a most important part in the action of the pump. Indeed, their function is a most important one, and they may fitly be described as the 'lungs' of the pump" (p. 82).

"A speed of 100 feet per minute is quite sufficient for small steam pumps if an excessive resistance in the rising main is to be avoided" (p. 94).

Apart from the resistance due to the head, which is the same whether the pump is large or small, a pump